

# PATENT SPECIFICATION (11)

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## (54) A SHAFT AND HUB ASSEMBLY

(71) We, ZAHNRADFABRIK FRIEDRICHSHAFEN AKTIENGESELLSCHAFT, of Friedrichshafen-on-the-Bodensee, Federal Republic of Germany, a Joint-Stock Company organised under the laws of the Federal Republic of Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—  
 This invention relates to a shaft and hub assembly including circlip means for securing said shaft and hub against relative axial displacement in only one direction.  
 For axially securing a shaft-hub connection which rotates at high speed or is subject to shock loading it is known to use a divided ring together with a bandage to prevent the ring lifting-off radially out of its groove. Such securing is complicated, cumbersome, and comparatively expensive.  
 The invention aims at providing securing means which makes it impossible for the circlip to lift off radially. At the same time said means should take up little space, and should be inexpensive and easily fitted.  
 Accordingly, the present invention consists in a shaft and hub assembly including circlip means for securing said shaft and hub against relative axial displacement in only one direction, wherein a first circlip is accommodated in a groove in the shaft and abuts a portion of an adjacent end face of the hub, and a second circlip is accommodated in a groove in the bore of the hub and surrounds said first circlip circumferentially in a substantially common plane.  
 The invention makes it possible to provide a circlip fastener in a simple manner, this being achieved by the use of the second circlip which comes to lie over the first circlip, the first circlip being supported on the inside diameter of the second circlip by its own force or by the action of a high rotational speed. The grooves for the two circlips may be formed in such a manner that for assembly purposes the second circlip can easily be inserted into its groove by passing over the first circlip. This is achieved through the fact that the groove for the first

circlip is made deeper than is normally the case, so that on insertion of the second circlip the first can penetrate into its groove to the extent of the depth of the groove of the second circlip.

In order that the invention may be more readily understood, reference is made to the accompanying drawings which illustrate diagrammatically and by way of example two embodiments thereof and in which:—

Fig. 1 is an axial view of a first embodiment of a shaft and hub assembly in accordance with the invention,

Fig. 2 is a cross-section on the line II—II of Fig. 1, showing the position of the circlips when the shaft is stationary,

Fig. 3 is a cross-section through another embodiment of a shaft and hub assembly in accordance with the invention, showing the position of the circlips,

Fig. 4 is a similar cross-section to that of Fig. 3, with the outer circlip removed, and

Fig. 5 shows the insertion of the outer circlip in the embodiment of the invention shown in Figs. 3 and 4.

In the drawings the same references are used for identical parts.

Reference numerals 1 and 2 indicate circlips of known construction, for shafts or for bores, which circlips are disposed in a substantially common plane one within the other in their respective grooves 3 and 4 in a shaft 6 and in the hub 5 which is to be fastened on the shaft. The circlips 3 abuts a portion of an adjacent end face of the hub 5. In the embodiment of Figs. 1 and 2, the grooves and the cross-sections of the circlips are so dimensioned that a gap substantially equal to the depth of the hub-groove 4 is formed between the two circlips when in their assembled positions.

For assembly purposes the circlip 1 and thereafter the circlip 2 are inserted in known manner into their grooves. When the shaft is then rotated at high speed and the circlip 1 tends to lift off radially, it will be able to do so only to a slight extent and will then bear against the circlip 2.

In the embodiment of the invention shown in Figs. 3 to 5, the arrangement of the shaft

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and hub grooves 3 and 4 is the same as in the first embodiment. The difference is that instead of the circlip 1 lying against the bottom of the shaft groove 3, use is made of a circlip 7 which is of slightly larger diameter than the circlip 1 and which after being fitted in position comes to bear against the inner periphery of the circlip 2 (Fig. 3). The constant expanding and contracting, to which the inner circlip 1 is usually subjected, upon rotation of the shaft, is thereby avoided, so that its life can be lengthened. For assembly purposes the inner circlip 7 is first introduced (Fig. 4), and is then pressed into the depth of its groove 3 and at the same time the circlip 2 is pushed over it (Fig. 5). When the circlip 2 now engages in its groove 4, the circlip 1 will spring open until it bears against the inner periphery of the circlip 2 (Fig. 3).

WHAT WE CLAIM IS:—

1. A shaft and hub assembly including circlip means for securing said shaft and hub against relative axial displacement in only one direction, wherein a first circlip is accommodated in a groove in the shaft and abuts a portion of an adjacent end face of

the hub, and a second circlip is accommodated in a groove in the bore of the hub and surrounds said first circlip circumferentially in a substantially common plane.

2. An assembly as claimed in Claim 1, wherein the first circlip lies against the bottom of its groove, and wherein between the two circlips a gap is formed which is substantially equal to or is slightly larger than the depth of the bore groove.

3. An assembly as claimed in Claim 1, wherein the first circlip lies resiliently against the inside diameter of the second circlip, and wherein between the first circlip and the bottom of its groove a gap is provided which is substantially equal to or is slightly larger than the depth of the bore groove.

4. A shaft and hub assembly, substantially as herein described with reference to and as shown in the accompanying drawings.

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FIG. 2

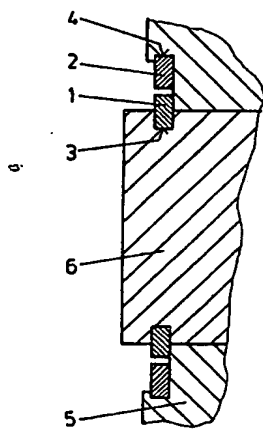


FIG. 1

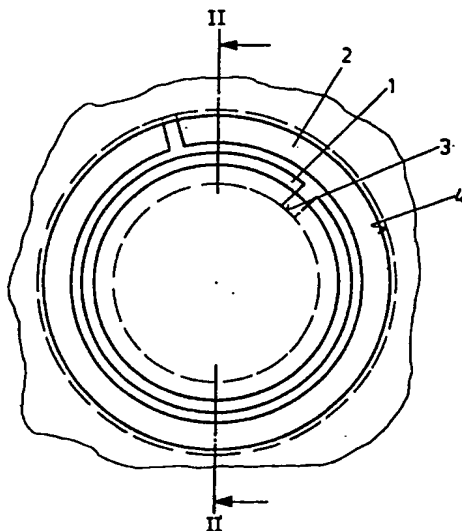


FIG. 3

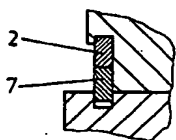


FIG. 4

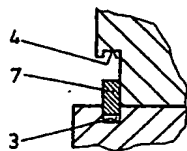
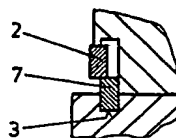


FIG. 5



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